



Laramie Energy, LLC

Mesa County, CO

Nichols 24-06A

Nichols 0994-13-21W

B-3

Design: B-3

QES Survey Report

29 January, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Nichols 0994-13-21W
Project:	Mesa County, CO	TVD Reference:	well @ 7161.0usft (H&P #290)
Site:	Nichols 24-06A	MD Reference:	well @ 7161.0usft (H&P #290)
Well:	Nichols 0994-13-21W	North Reference:	True
Wellbore:	B-3	Survey Calculation Method:	Minimum Curvature
Design:	B-3	Database:	EDM 5000.1 Single User Db

Project	Mesa County, CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Central Zone		

Site	Nichols 24-06A				
Site Position:		Northing:	1,529,702.08 usft	Latitude:	39.264528
From:	Lat/Long	Easting:	2,340,203.74 usft	Longitude:	-107.830633
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.47 °

Well	Nichols 0994-13-21W					
Well Position	+N/-S	0.0 usft	Northing:	1,529,767.15 usft	Latitude:	39.264708
	+E/-W	0.0 usft	Easting:	2,340,222.69 usft	Longitude:	-107.830572
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	7,137.0 usft

Wellbore	B-3				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	1/11/2018	9.54	65.42	51,352.72825355

Design	B-3				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	325.92	

Survey Program	Date	1/29/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
201.0	7,931.0	QES MWD Surveys (B-3)	MWD default	MWD - Standard	

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
First MWD Survey @ 201.0' MD / 200.9' TVD									
201.0	3.20	300.30	200.9	2.8	-4.8	5.1	1.59	1.59	0.00
291.0	4.70	298.20	290.7	5.8	-10.3	10.6	1.67	1.67	-2.33
382.0	7.10	314.30	381.2	11.5	-17.6	19.4	3.18	2.64	17.69
472.0	8.50	315.70	470.4	20.2	-26.2	31.4	1.57	1.56	1.56
564.0	10.20	324.30	561.1	31.7	-35.7	46.2	2.39	1.85	9.35
654.0	11.40	324.30	649.5	45.4	-45.5	63.1	1.33	1.33	0.00
744.0	13.40	326.90	737.4	61.3	-56.4	82.4	2.31	2.22	2.89
835.0	15.40	326.00	825.6	80.2	-68.9	105.0	2.21	2.20	-0.99
926.0	15.50	325.30	913.3	100.2	-82.6	129.3	0.23	0.11	-0.77



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Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,021.0	15.80	322.90	1,004.8	120.9	-97.7	154.9	0.75	0.32	-2.53
1,115.0	18.80	327.70	1,094.5	144.0	-113.5	182.8	3.53	3.19	5.11
1,210.0	20.40	326.70	1,184.0	170.7	-130.7	214.7	1.72	1.68	-1.05
1,304.0	23.00	328.20	1,271.3	200.0	-149.4	249.4	2.83	2.77	1.60
1,399.0	25.10	330.30	1,358.1	233.3	-169.2	288.0	2.39	2.21	2.21
1,493.0	26.10	330.50	1,442.9	268.6	-189.2	328.5	1.07	1.06	0.21
1,526.0	26.30	331.10	1,472.5	281.3	-196.4	343.1	1.01	0.61	1.82
1,618.0	28.30	331.70	1,554.2	318.4	-216.5	385.1	2.19	2.17	0.65
1,713.0	28.50	330.80	1,637.8	358.0	-238.3	430.0	0.50	0.21	-0.95
1,807.0	27.60	330.10	1,720.7	396.5	-260.1	474.1	1.02	-0.96	-0.74
1,902.0	29.80	327.60	1,804.1	435.5	-283.7	519.7	2.64	2.32	-2.63
1,996.0	28.90	327.00	1,886.0	474.3	-308.6	565.7	1.01	-0.96	-0.64
2,091.0	27.70	327.80	1,969.6	512.2	-332.9	610.7	1.32	-1.26	0.84
2,186.0	30.10	326.00	2,052.8	550.6	-357.9	656.6	2.69	2.53	-1.89
2,281.0	29.00	327.30	2,135.5	589.8	-383.7	703.5	1.34	-1.16	1.37
2,375.0	28.30	327.50	2,217.9	627.7	-408.0	748.5	0.75	-0.74	0.21
2,470.0	27.10	326.40	2,302.1	664.7	-432.1	792.7	1.37	-1.26	-1.16
2,565.0	26.60	325.40	2,386.8	700.3	-456.1	835.6	0.71	-0.53	-1.05
2,659.0	29.30	325.40	2,469.8	736.5	-481.1	879.6	2.87	2.87	0.00
2,754.0	28.50	324.90	2,553.0	774.2	-507.4	925.6	0.88	-0.84	-0.53
2,849.0	29.10	326.40	2,636.3	812.0	-533.2	971.3	0.99	0.63	1.58
2,943.0	28.80	326.10	2,718.5	849.8	-558.5	1,016.8	0.35	-0.32	-0.32
3,038.0	28.40	324.90	2,801.9	887.3	-584.2	1,062.3	0.74	-0.42	-1.26
3,132.0	27.50	325.40	2,885.0	923.5	-609.4	1,106.3	0.99	-0.96	0.53
3,227.0	29.60	326.00	2,968.4	961.0	-635.0	1,151.7	2.23	2.21	0.63
3,321.0	28.60	326.10	3,050.5	998.9	-660.5	1,197.5	1.07	-1.06	0.11
3,416.0	29.80	326.90	3,133.5	1,037.5	-686.1	1,243.8	1.33	1.26	0.84
3,510.0	28.90	326.40	3,215.4	1,076.0	-711.4	1,289.9	0.99	-0.96	-0.53
3,605.0	28.10	326.40	3,298.9	1,113.8	-736.5	1,335.2	0.84	-0.84	0.00
3,700.0	29.90	326.00	3,382.0	1,152.1	-762.1	1,381.2	1.91	1.89	-0.42
3,795.0	28.90	325.70	3,464.7	1,190.7	-788.3	1,427.9	1.06	-1.05	-0.32
3,889.0	27.70	325.30	3,547.5	1,227.4	-813.5	1,472.4	1.29	-1.28	-0.43
3,983.0	28.90	325.80	3,630.3	1,264.1	-838.7	1,517.0	1.30	1.28	0.53
4,078.0	27.90	325.20	3,713.8	1,301.4	-864.3	1,562.2	1.09	-1.05	-0.63
4,172.0	29.70	324.50	3,796.2	1,338.4	-890.4	1,607.5	1.95	1.91	-0.74
4,267.0	29.10	324.00	3,879.0	1,376.2	-917.6	1,654.1	0.68	-0.63	-0.53
4,362.0	28.10	323.70	3,962.4	1,413.0	-944.5	1,699.5	1.06	-1.05	-0.32
4,456.0	29.10	322.40	4,044.9	1,448.9	-971.5	1,744.5	1.25	1.06	-1.38
4,551.0	27.60	321.80	4,128.5	1,484.5	-999.2	1,789.5	1.61	-1.58	-0.63
4,645.0	28.70	325.70	4,211.4	1,520.3	-1,025.4	1,833.8	2.28	1.17	4.15
4,739.0	27.60	324.60	4,294.3	1,556.7	-1,050.7	1,878.1	1.29	-1.17	-1.17
4,834.0	26.70	323.60	4,378.8	1,591.8	-1,076.2	1,921.4	1.06	-0.95	-1.05
4,928.0	25.30	327.40	4,463.3	1,625.7	-1,099.5	1,962.6	2.31	-1.49	4.04



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Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
5,023.0	23.40	325.10	4,549.8	1,658.3	-1,121.3	2,001.8	2.23	-2.00	-2.42	
5,117.0	22.00	327.90	4,636.6	1,688.5	-1,141.3	2,038.0	1.88	-1.49	2.98	
5,212.0	20.60	325.30	4,725.1	1,717.3	-1,160.3	2,072.5	1.78	-1.47	-2.74	
5,306.0	19.10	329.90	4,813.5	1,744.2	-1,177.4	2,104.4	2.30	-1.60	4.89	
5,401.0	17.50	328.00	4,903.7	1,769.8	-1,192.8	2,134.2	1.80	-1.68	-2.00	
5,496.0	16.20	331.20	4,994.6	1,793.5	-1,206.7	2,161.7	1.68	-1.37	3.37	
5,590.0	14.80	333.80	5,085.2	1,815.8	-1,218.3	2,186.6	1.66	-1.49	2.77	
5,685.0	11.30	329.20	5,177.7	1,834.7	-1,228.5	2,207.9	3.84	-3.68	-4.84	
5,780.0	10.90	327.60	5,270.9	1,850.3	-1,238.0	2,226.2	0.53	-0.42	-1.68	
5,874.0	8.20	332.70	5,363.6	1,863.7	-1,245.9	2,241.8	3.01	-2.87	5.43	
5,968.0	6.50	330.20	5,456.8	1,874.3	-1,251.6	2,253.7	1.84	-1.81	-2.66	
6,063.0	4.50	330.09	5,551.4	1,882.2	-1,256.1	2,262.8	2.11	-2.11	-0.12	
6,158.0	4.70	324.40	5,646.1	1,888.6	-1,260.2	2,270.4	0.52	0.21	-5.99	
6,252.0	2.86	328.42	5,739.9	1,893.7	-1,263.7	2,276.6	1.98	-1.96	4.28	
6,347.0	2.90	336.59	5,834.8	1,897.9	-1,265.9	2,281.3	0.43	0.04	8.60	
6,441.0	0.97	337.12	5,928.7	1,900.9	-1,267.2	2,284.4	2.05	-2.05	0.56	
6,536.0	0.74	333.86	6,023.7	1,902.1	-1,267.7	2,285.8	0.25	-0.24	-3.43	
6,631.0	0.83	314.53	6,118.7	1,903.2	-1,268.5	2,287.1	0.29	0.09	-20.35	
6,726.0	1.05	311.01	6,213.7	1,904.2	-1,269.7	2,288.6	0.24	0.23	-3.71	
6,820.0	0.88	317.43	6,307.7	1,905.3	-1,270.8	2,290.2	0.21	-0.18	6.83	
6,915.0	1.36	290.71	6,402.7	1,906.3	-1,272.3	2,291.8	0.73	0.51	-28.13	
7,009.0	1.60	283.90	6,496.6	1,907.0	-1,274.7	2,293.7	0.32	0.26	-7.24	
7,104.0	0.35	293.70	6,591.6	1,907.4	-1,276.2	2,294.9	1.32	-1.32	10.32	
7,198.0	0.53	279.55	6,685.6	1,907.6	-1,276.9	2,295.5	0.22	0.19	-15.05	
7,293.0	1.14	281.04	6,780.6	1,907.8	-1,278.3	2,296.5	0.64	0.64	1.57	
7,387.0	0.40	279.55	6,874.6	1,908.1	-1,279.5	2,297.4	0.79	-0.79	-1.59	
7,482.0	1.19	281.66	6,969.6	1,908.3	-1,280.8	2,298.3	0.83	0.83	2.22	
7,577.0	1.63	292.47	7,064.5	1,909.1	-1,283.0	2,300.1	0.54	0.46	11.38	
7,671.0	1.98	276.03	7,158.5	1,909.7	-1,285.9	2,302.3	0.66	0.37	-17.49	
7,766.0	1.85	265.05	7,253.4	1,909.8	-1,289.0	2,304.1	0.41	-0.14	-11.56	
7,860.0	1.54	261.97	7,347.4	1,909.5	-1,291.8	2,305.4	0.34	-0.33	-3.28	
7,883.0	2.07	263.97	7,370.4	1,909.4	-1,292.5	2,305.7	2.32	2.30	8.70	
Projection to TD @ 7931.0' MD / 7418.4' TVD										
7,931.0	2.07	263.67	7,418.4	1,909.2	-1,294.2	2,306.5	0.02	0.00	-0.63	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
201.0	200.9	2.8	-4.8	First MWD Survey @ 201.0' MD / 200.9' TVD	
7,931.0	7,418.4	1,909.2	-1,294.2	Projection to TD @ 7931.0' MD / 7418.4' TVD	



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